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ABSTRACT

Data is reported on observations made in high and low socioeconomic status (SES) classrooms of second- and third-grade teachers' feedback to students on their replies to questions posed by the teacher. Teachers in the study were chosen due to consistent effectiveness in producing student achievement gains. Interactions (teacher's question, pupil's response, teacher feedback) are coded for type of question, quality of child's answer, and type of feedback. Analysis of teacher feedback is presented for (1) correct answers, (2) partially correct answers, (3) incorrect answers, (4) "I don't know" answers, and (5) no response from the pupil. Results of linear analyses indicated that effective teacher behaviors are different for high and low SES classrooms, with the successful low SES teachers concentrating on getting good responses from each child (by giving sustaining feedback and not calling on other pupils) and the successful high SES teachers concentrating on getting the right answer from any child. (MJB)

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Teacher Feedback to Children's Answers: Process-Product Relationships[1]

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The present paper was one of four presented at a "related papers" session at the 1975 annual meeting of the American Educational Research Association, entitled "Teacher Behavior and Student Outcomes: Texas Teacher Effectiveness Study."

Papers in the session included:

1. "Teacher Behaviors Related to Learning by Low vs. High Socio-economic Status Early Elementary Students," by Jere E. Brophy.
2. "Relationship of Teacher Praise and Criticism to Student Outcomes," by Carolyn M. Evertson.
3. "Teacher Feedback to Children's Answers: Process-Product Relationships," by Linda L. Mahaffey, Jere E. Brophy, and Carolyn M. Evertson.
4. "Error Rates and Question Difficulty Related to Elementary Children's Learning," by W. John Crawford, Carol E. King, Jere E. Brophy, and Carolyn M. Evertson.

This paper and the others presented in this session all provide data from the Texas Teacher Effectiveness Project, a two-year observational study of second and third grade teachers designed to identify relationships between teacher characteristics and student learning. The present paper is concerned with teacher responses to child answers, especially incorrect answers and failures to respond. As is true of much other data from this study, the most important findings showed contrasting relationships between teacher behavior and student learning in high SES and low SES schools. Before these findings are presented, the study as a whole will be described.

The study was a two-year replicated naturalistic observation study involving collection of classroom process data through both high and low inference instruments and presage data through questionnaires and interviews. The teacher effectiveness criteria were residual student gain scores on three language arts and two mathematics subtests of the Metropolitan Achievement Test Battery. The teachers included in this sample had been teaching at either second or third grade, respectively, for a minimum of four years when the study began, and they were among the most consistent teachers in producing student learning gains across time (school years), sex of student, and subtest. Residual gains for each student were computed within each year, within each subtest, within sex, and within Title I versus non-Title I schools (because different tests were used in these two different kinds of school). These residual gain scores for individual students were then summed and averaged to produce a mean residual gain for each teacher's class. This was done for three consecutive years for a total of 165 teachers. From these, those who were most consistent across the five subtests, the two sexes, and the three years of data were selected for

study. This was done because it was felt that teachers most consistent in producing student learning gains would be most likely to behave consistently in the classroom and thus yield the most clear and interpretable process-product relationships. (For detailed reports of the rationale and statistics involved in sample selection, as well as for details of the data discussed in the present report, see the bibliography listed at the end of the paper.) It should be kept in mind that the only criterion of teacher effectiveness for the results discussed in this paper was teacher ability to produce student learning gains on standardized achievement tests.

Thirty-one teachers were observed in the first year for about ten hours each, and 28 teachers were observed in the second year for about 30 hours each. Nineteen teachers were observed both years. The low inference system used was an expanded version of the Brophy-Good Dyadic Interaction Observation System (Brophy and Good, 1970). Each process variable from the teachers was analyzed for linear correlations and for non-linear relationships to student outcome criteria. (Details of non-linear analysis are discussed at length in Brophy and Evertson, Note 1). The data are available as separate analyses for each process variable with each of five subtests of the Metropolitan, and results were obtained separately for the two years, sex of student, and classroom context (general class vs. reading group instruction). For the sake of a clear overview, however, this report will focus on general trends across all of these contextual variables, except where noted.

The process variables measured with the coding system which are of interest to this paper are public response opportunities in which the teacher asks a question, a child responds, and the teacher responds to the child's answer. These interactions were coded for type of question, quality of child answer, and type of teacher feedback. Questions were classified as process (requiring explanations and integration of facts, such as "how" and "why" questions), product (requiring short factual answers), and choice (choosing between two or more alternatives). Children's answers were classified as correct, partly correct, incorrect, a response of "I don't know," or no response. Teacher feedback categories were broadly classified as terminal (the teacher stopping the student's response opportunity) or sustaining (the teacher staying with the original child and eliciting another response). In addition to or instead of these types of feedback, the teacher might give process feedback (explaining by discussing the processes used to arrive at an answer) or no feedback at all. Simple acknowledgement of correctness or incorrectness was not coded.

Terminal teacher feedback categories were giving the answer, asking another student for the answer, or a call out by another student before the teacher had a chance to respond to the first child's answer.

Sustaining feedback categories included repeating the original question, rephrasing the original question or giving a clue, or asking a new question to the same child.

A frequency was computed for each teacher of the types of feedback following each type of answer (for example, giving the answer after an incorrect response). It was hoped that this type of analysis could be ex-

tended to include the level of question to see if optimal feedback to incorrect answers to process questions differed from optimal feedback to product and choice questions. However, the frequency of incorrect responses to process questions was so low that analysis could not be carried out. This was due primarily to the low frequencies of process questions themselves, at least as defined in the coding system used. Perhaps a more useful distinction in future studies at these early grade levels would be between absolute factual questions ("What date was . . . ?") versus factual questions which can be figured out with some help ("What is this word?" when the word can be sounded out with phonic clues.)

Teacher Responses to Correct Answers

Only three variables were analyzed with respect to correct answers, since the other categories were not appropriate when the child's response was correct. When occurrence of no feedback was analyzed, some surprisingly positive trends were noted for low SES classrooms, with predominantly inverted-U relationships for high SES classrooms. The low SES results were unexpected, since lack of feedback was presumed to be undesirable. However, this may reflect a high incidence of fast-paced drilling, in which a lack of feedback implied a correct answer. Presumably, the children in low SES classrooms are in greater need than higher SES students of working on the basic tool skills. These can be taught through repetition and practice, and one way to do this is to use a rapid pace. However, when incidence of drilling was analyzed as a separate variable, there were not strong positive trends for drill in low SES schools.

Process feedback showed some weak but negative relationships for low SES schools, but positive correlations for high SES schools. Again, the

observed differences between these two types of schools in pacing and curricular content may explain this. If a teacher wanted to maintain a rapid pace, then giving process feedback would interrupt that pace. If you presume that low SES teachers can teach tool skills best by rapid pacing, then process feedback often would not be appropriate. Also, the very nature of those basic tool skills (reading, writing, spelling, counting, etc.) may rule out need for process feedback. Perhaps the high SES students were studying material for which process feedback was more appropriate.

Asking a new question after a correct answer showed contradictory results. For low SES classrooms, there were negative correlations for this type of feedback in general class discussions, but a positive trend in the reading group data. There were few significant relationships for general class discussions for high SES classrooms, but negative correlations in reading group. These confusing results probably occurred because this category confounded two types of new questions, academic questions ("What is the first letter?") and questions related to management ("Did you take your book home to study?").

Teacher Responses to Part-Correct Answers

Part-correct answers were rare, and results of the analyses offer few clear-cut conclusions because of this.

There were not sufficient data to analyze no feedback or process feedback, except for one set of process feedback data for high SES. There was a negative relationship shown here, in contrast to the positive relationship demonstrated for process feedback to correct answers for high SES classrooms.

Giving the answer after a part-correct response was generally positively

related to learning for both high and low SES. There were mixed results for asking another child for the answer, and not enough data to analyze for call outs.

Repeating the question showed some positive curvilinear relationships for high SES, but usually there were insufficient data to analyze this variable for low SES, except in the reading group setting, where one strong negative relationship was shown. Rephrasing the question and asking a new question resulted in generally positive relationships for low SES and negative relationships for high SES. This trend will be discussed further with regard to incorrect answers and failure to respond.

In general, the data for part-correct answers were too sparse to support strong conclusions.

Teacher Responses to Incorrect Answers

The data for incorrect responses and feedback to them offered more clear-cut differences between optimal behavior in low and high SES than did the data for correct or part-correct answers. A trend is apparent here which is repeated in the data for "I don't know" answers and for failures to respond. This trend suggests that teachers of low SES children should stay with the original respondent and attempt to get an improved response rather than moving on to another child for the answer. The data for high SES classrooms suggest the opposite as being optimal behavior.

There usually were not enough data to analyze for no feedback to incorrect answers, although some analyses were performed for general class interactions for low SES. These showed a negative trend, although none of the correlations reached significance. Process feedback showed mostly

negative relationships for both high and low SES classrooms, although the data here are not conclusive, due to some uninterpretable and weak curvilinear results.

The data for giving the answer showed mixed results for low SES and some negative relationships for high SES. Asking another child showed markedly negative results for low SES children and some positive results for high SES. There were no data for call outs for high SES classrooms, and only one negative relationship for call outs in low SES classrooms was obtained.

Repeating the question after an incorrect answer showed generally negative curvilinear relationships for both high and low SES classrooms. However, rephrasing the question and providing some additional help beyond simply repeating it showed positive relationships for low SES and one negative relationship for high SES. Asking a new question revealed positive but curvilinear relationships for low SES, but mixed but mostly negative relationships for high SES. Again, this variable must be interpreted with caution, since it can represent new questions which provide a clue for answering the previous one, new questions that are completely different from the previous one, or management questions unrelated to the content though pertinent to the child's performance ("Did you study?").

In general, then, the data for teacher responses to incorrect answers suggest different optimal approaches for low SES versus high SES children, especially for the variables of going on to another child for the answer versus staying with the original respondent and providing extra help.

Teacher Responses to "I Don't Know" Answers

There were insufficient data to analyze for no feedback to "I don't know" answers. Most of the teachers in the sample, therefore, were making some kind of response to an "I don't know" answer, and we feel that this represents an appropriate procedure, although there was not enough variance among the teachers to analyze it.

Process feedback was not an applicable category in the coding system as a response to "I don't know."

There also were insufficient data to examine giving the answer and call outs in this situation. As was the case with no feedback to "I don't know," we feel that the lack of call outs represents an appropriate procedure on the part of most of the teachers in the sample.

The results of asking another student for the answer were similar to the results of this variable for incorrect answers: there were negative relationships for low SES classrooms and positive results for high SES classrooms.

There were not enough data to examine separately the categories of repeating the question, rephrasing the question, or asking a new question following an "I don't know" response, but when these categories were combined to look at the effect of sustaining feedback in general, some negative relationships were demonstrated for high SES students, with insufficient data for low SES. Again, this is comparable to the results of feedback to an incorrect answer, in that a negative relationship was demonstrated for high SES classrooms for sustaining the child.

In summary, the data for reactions to "I don't know" responses further support the conclusions that low SES teachers, but not high SES teachers,

should sustain with the original child instead of going on to another child for an answer.

Teachers Response to No Responses

As with "I don't know" answers, there were not enough instances of no feedback to analyze for failures to respond. (Again, this probably represents the realization by most of the teachers that it is appropriate to respond in some way in this situation.) Again, process feedback was an inapplicable coding category as a teacher response to a child's failure to respond.

There either were insufficient data for analysis of giving the answer or non-significant results when analysis was possible. The results for asking another child correspond to those for incorrect or "I don't know" responses, in that there was a strong negative relationship of such teacher behavior to learning gains in low SES classrooms and a positive one for high SES. These relationships were especially strong in reading group data. Call outs following another student's failure to respond were rare. Where it was possible to analyze them, there were positive relationships for low SES but negative for high SES. This is comparable to the results obtained with the analysis of method of selection of original respondents for questions, in which called out answers were positively associated with learning in low SES but negatively in high SES. One interpretation of these results is that a problem in low SES schools may be motivating the students and keeping their attention, while this is not as severe a problem in high SES schools. Perhaps a higher frequency of call outs in low SES schools demonstrates that the students are motivated and attending to the lesson.

When total sustaining feedback was analyzed for no response situations, a positive relationship resulted for low SES and a negative one for high SES. When the separate categories of sustaining feedback were analyzed, the results were not quite as clear-cut. Data for repeating the question were mostly mixed and curvilinear, but they showed some evidence of positive relationships in low SES and negative ones in high SES. There also were a few positive relationships for rephrasing the question for low SES and negative, though curvilinear, relationships for high SES. There were either insufficient data for analysis or non-significant results when analysis was possible for new questions following a failure to respond.

In summary, the data for teacher reactions to student failure to make any kind of response again shows the trend present in the data for incorrect and "I don't know" answers with regard to sustaining versus asking another child.

Summary and Discussion

The results for teacher feedback to children's answers indicates vastly different optimal behaviors for teachers of low SES and high SES students. The two variables for which this is noted most consistently are asking another child for an answer following a failure to respond correctly and sustaining with the original respondent when this situation has occurred.

The more successful low SES teachers did not ask other students to provide answers when the original respondent had not answered correctly, and were more likely to sustain with that child in an attempt to improve his or her answer. This help was more likely to take the form of clues or rephrasing rather than simply repeating the question. The effective high

SES teacher, on the other hand, was likely to go on to another child when the original respondent did not answer correctly, and was less likely to sustain with a child to improve a response.

The explanation for such differences probably lies in the different characteristics and needs of the children. Although one cannot classify all of the children in either SES group as homogenous, the average levels of performance and motivation appeared to differ between low and high SES schools. The dominant need of children in low SES schools was to learn basic tool skills and to overcome motivational and attentional problems which often detracted from optimal school performance, especially a fear of responding. The teacher who encourages a competitive atmosphere in this setting (such as by asking other children for answers when one child has failed) is going to be less encouraging than the teacher who stays with that child to help him or her improve an answer.

Other evidence from this study has revealed that the effective low SES teacher tends to be supportive rather than demanding and critical. The data for teacher feedback support this finding. Another possible explanation for the results is the children in low SES schools might not be very good at listening to other children's answers and learning from them. If this is the case, the teacher who stays with a child until he or she gets the answer or is given it by the teacher might be more successful with that child than the teacher who went on to someone else who already knew the answer.

In high SES schools, on the other hand, motivation is not generally as compelling a problem as in low SES schools. If anything, the teacher may have more of a problem in dealing with over-zealous children. There

is less reason to sustain with a high SES child, because a failure to respond correctly probably does not represent a fear of responding or a failure to adequately consider the question, but instead indicates a real lack of knowledge on the child's part. Since many questions asked at this age level are of minimal complexity, it often may be difficult to improve a child's response when he or she already has answered as completely as possible. Since these children are likely to learn from listening to their classmates, the teacher can go on to someone else and get the answer without failing to teach the first child.

The major finding of this aspect of the study, then, is that what is optimal teacher feedback to children's answers, especially incorrect answers or failures to respond, depends upon the type of children being taught. In general, low SES teachers should concentrate on getting good responses from each child, while high SES teachers should concentrate on getting the right answer, from any child.

These conclusions, of course, are limited to the early elementary grades and/or to situations where the students have the characteristics described above (anxious poor listening skills vs. eager good listening skills). Optimal teacher reactions to responses (or failure to respond) by older students (or any students who do not fit these descriptions) probably differ from the optimal patterns revealed here.

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